

separating the types of form data corresponding to an image with text into a type of form data corresponding to the image as the first kind of attribute and a type of form data corresponding to the text as the second kind of attribute;

storing each of the types of separated form data in a different storage location according to one of the first kind of attribute and the second kind of attribute of each type of the separated form data;

reading each one of the plural types of stored form data;

applying a different image process to each one of the read plural types of stored form data; and

outputting the processed form data on one page.

REMARKS

Claims 1-12 are pending in this application and have been rejected. Amendments to claims 1, 6, 11, and 12 are presented herein. Claims 13-30 are newly added in this response. No new matter is being presented, and approval and entry are respectfully requested.

Rejections Under 35 U.S.C. §102

The Examiner rejected claims 1-12 under 35 U.S.C. §102(e) as being anticipated by Kageyama et al. (U.S. Patent No. 5,774,638). The Examiner also rejected claims 1-12 under 35 U.S.C. §102(e) as being anticipated by Schweid et al. (U.S. Patent No. 5,835,630). Applicants respectfully traverse these rejections for the reasons presented below.

The Invention

The present invention relates to a printing apparatus and method capable of individually processing a plurality of data (i.e., "print data") to be printed on one page. The print data contains various types of data, each having an attribute, such as text data or form data. The print data are stored in an image buffer according to the attributes and independently read by a plurality of video interfaces (VIFs). Each one of multiple image processing circuits applies various image processes to the data output from one of the VIFs, so more than one kind of image processing may be performed for one page. For example, a smoothing process may be applied to text data while an intermediate tone process may be applied to image data. A print

data integration circuit integrates the print data read by the VIFs into one unit of print data for printing on one page.

Thus, the present invention provides multiple video interfaces and image processing circuits that allow more than one type of data to be printed on a single page. Accordingly, it is possible to apply a particular kind of image process to each type of print data read by each VIF, and then print the independently-processed data on one page.

The References

Kageyama et al. Kageyama relates to a print controlling apparatus and method for consecutively printing a plurality of pages constituting a document. In Kageyama, drawing processes and print processes for respective pages are performed by a plurality of processors using print commands that range over a plurality of pages. The drawing processes for different pages are assigned to different processors. Imaginary drawing operations for setting drawing attribute parameters of respective pages are executed without executing real (actual) drawing operations. The real drawing operations are executed for pages having completed the imaginary drawing operations. See Kageyama, abstract; col. 2, lines 15-20; col. 2, lines 27-33; col. 2, lines 53-54; col. 12, lines 37-38.

Schweid et al. Schweid relates to a two-dimensional non-separable digital filter having a plurality of separable one-dimensional digital filters (Schweid at col. 1, lines 6-9). The image processing system shown in Fig. 11 of Schweid includes a data buffer 10 that receives a stream of image pixels as input image data from an image input terminal. The image pixels are stored in the data buffer 10 in raw grey format. The image processing section 30, which includes processing units 31, 32, and 34, operates concurrently with the probabilistic classifier 25 on the image data output from the data buffer 10. The classifier 25 classifies the image data as a ratio of a number of predetermined classes of imagery and outputs probabilities 27 corresponding to each class. A mixer 41 combines a percentage of each class of output image data from processing units 31, 32, and 34 according to the ratio of the probabilities 27 determined by the classifier 25. The resulting output image data from the mixer 41 are stored in output buffer 50. See Schweid at col. 3, line 33 to col. 4, line 40.

The Present Claimed Invention Distinguishes Over the Prior Art

Claim 1 of the present invention specifies, as amended, that each type of print data has an attribute, designated by a host computer, comprising one of a first kind of attribute and a second kind of attribute, and that each kind of print data is stored in a different storage location of an image buffer according to the attribute of that print data. Independent claims 6, 11, and 12 recite similar language.

In the present invention, a host computer sends print data to the printer. When the print data include more than one attribute or type of data, the host computer designates or identifies the attribute of each item of print data. For example, form print data is one type of attribute and text print data is another type of attribute. Thus, the print data are distinguished by the host computer based upon attribute. Each item of print data having a different attribute is stored in a different storage location of the image buffer, resulting in separation of the print data received from the host computer according to type of attribute.

The Kageyama Reference

The Examiner either repeated or modified his prior art rejections from the prior Office Action. Applicants maintain their arguments with respect to these claims, as found in the prior Amendment filed August 14, 2001. Specifically, Kageyama does not disclose separating print data according to the type of attribute and storing each type of print data in separate buffer locations. While Kageyama may disclose that a page is divided into a plurality of areas, Kageyama neither discloses how these areas are selected, nor that each area is selected according to attribute type. Thus, each area of Kageyama could contain more than one type of print data, making processing of the data, such as by application of the smoothing process, more difficult because more than one kind of attribute may be involved. Also, while a host computer in Kageyama may transmit a chain of subcommands for setting drawing attribute parameters, these commands appear in Figure 26 of Kageyama to be provided for each page, not for individual buffer areas. Kageyama does not disclose dividing the subcommands according to the type of data for which a subcommand is applicable.

The Schweid Reference

The Examiner asserted on page 5 of the Office Action that the image buffer of the present invention reads on the data buffer 10 of Fig. 11. The Examiner also asserted that column 3, lines 43-65 of Schweid discloses storing each type of print data, one by one, in a

different one of the storage locations of the image buffer according to the kind of attribute of each type of print data. The cited portion of Schweid discloses that a stream of image pixels are fed to a data buffer 10. The image data stored in the buffer 10 are in raw grey format. The image pixels stored in data buffer 10 are transmitted **from data buffer 10** to the processing units 31, 32, and 34 and to a probabilistic classifier 25 to provide an output value that characterizes a property of the image data transmitted from data buffer 10, such as its peak count.

Thus, the image processing system of Schweid does not separate the data according to attribute and then store each item of data in the data buffer 10 according to its attribute. In other words, the data buffer 10 of Schweid does not receive each type of separated print data, one by one, in different ones of the storage locations according to the kind of attribute of each item of separated print data, as claimed in the present invention.

The Dependent Claims

The dependent claims depend from the above-discussed independent claims and are patentable over the prior art for the reasons discussed above. The dependent claims also recite additional features not taught or suggested by the prior art. For example, claim 3 specifies separating print data according to a first kind of attribute and a second kind of attribute and storing the separated print data in an image buffer according to the first kind of attribute and the second kind of attribute. These features are not taught nor suggested by the cited references. Therefore, for at least this reason and the reasons set forth above with respect to claim 1, it is submitted that the dependent claims patentably distinguish over the prior art.

Therefore, Applicants submit that claims 1-12 patentably distinguish over the prior art. Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejections under §102.

New Claims

Claims 13-30 are newly added with this response to alternatively define the present invention. Claim 13 specifies separating print data according to a first kind of attribute and a second kind of attribute and storing the separated print data in different storage locations according to the first kind of attribute and the second kind of attribute. Claims 14 and 15 recite language similar to that of claim 13. Claims 16, 21, 26, and 27 are variations of claims 1, 6, 11,

and 12, respectively. Claim 28 specifies separating form data according to a first kind of attribute and a second kind of attribute and storing the separated form data in different storage locations according to the first kind of attribute and the second kind of attribute. Claims 29 and 30 recite language similar to that of claim 28. The features recited in new independent claims 13-16, 21, and 26-30 are not taught or suggested by the cited references. Claims 17-20 and 22-25 depend from the new independent claims. Thus, for at least the reasons presented above, Applicants submit claims 13-30 patentably distinguish over the prior art. Accordingly, Applicants respectfully request allowance of the new claims.

CONCLUSION

It is submitted that neither of the references teaches the present claimed invention. Thus, claims 1-30 are deemed to be in a condition suitable for allowance. Reconsideration of the claims and an early Notice of Allowance are earnestly solicited.

If there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

Finally, if there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

STAAS & HALSEY LLP

Date: 4/10/02

By: C. Joan Gilsdorf
Christine Joan Gilsdorf
Registration No. 43,635

Suite 500
700 Eleventh St., N.W.
Washington, D.C. 20001
(202) 434-1500

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on April 10, 2002
STAAS & HALSEY
By: C. Joan Gilsdorf
Date: 4/10/02

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS

Please **AMEND** the following claims:

1. (THREE TIMES AMENDED) A printer outputting a plurality of types of print data corresponding to one or more images to be printed on one page, each of the types of print data having an attribute comprising one of a first kind of attribute and a second kind of attribute and being designated by a host computer, said printer comprising:

an image buffer having a plurality of storage locations and storing each type of print data, one by one, in a different one of the storage locations according to one of the first kind of attribute and the second kind of attribute of each type of print data;

a plurality of video interfaces, each of said video interfaces independently reading one of the types of print data stored in a corresponding storage location of said image buffer;

a print data integration circuit integrating the plurality of types of print data read by said video interfaces to be printed on one page; and

an output mechanism outputting the integrated print data on one page.

6. (THREE TIMES AMENDED) A controller controlling a plurality of types of print data to be printed on one page, each of the types of print data having an attribute comprising one of a first kind of attribute and a second kind of attribute and being designated by a host computer, said controller comprising:

a plurality of video interfaces, each of said video interfaces independently reading one of the types of print data stored in a corresponding one of a plurality of storage locations of an image buffer according to one of the first kind of attribute and the second kind of attribute of each type of print data; and

a print data integration circuit integrating the plurality of types of print data read by said video interfaces to be printed on one page.

11. (TWICE AMENDED) A printer processing a plurality of types of print data according to an attribute of each type of print data, the attribute comprising one of a first kind of attribute and a second kind of attribute and being designated by a host computer, and the print data to be printed on one page, comprising:

an image buffer storing each type of print data in a corresponding one of a plurality of storage locations of said image buffer;

a plurality of video interfaces, each of said video interfaces independently reading one of the types of print data stored in a corresponding storage location of said image buffer; and

a plurality of image processing circuits, each of said image processing circuits applying an image process to the type of print data read by a corresponding one of said video interfaces.

12. (TWICE AMENDED) A method of processing a plurality of types of print data according to an attribute of each type of print data, the attribute comprising one of a first kind of attribute and a second kind of attribute and being designated by a host computer, the print data to be printed on one page, comprising:

storing each type of print data in a different storage location;

reading each one of the plural types of stored print data;

applying a different image process to each one of the read plural types of stored print data; and

outputting the processed print data on one page.

Please **ADD** the following new claims:

13. (NEW) A printer outputting a plurality of types of print data corresponding to one or more images to be printed on one page, each of the types of print data having an attribute comprising one of a first kind of attribute and a second kind of attribute, said printer comprising:

a separation unit separating the types of print data corresponding to an image with text into a type of print data corresponding to the image as the first kind of attribute and a type of print data corresponding to the text as the second kind of attribute;

a storage unit storing each of the types of separated print data in a different one of storage locations according to one of the first kind of attribute and the second kind of attribute of each type of the separated print data;

an image buffer having a plurality of the storage locations and storing each type of the separated print data, one by one, in a different one of the storage locations according to one of the first kind of attribute and the second kind of attribute of each type of the separated print data;

a plurality of video interfaces, each of said video interfaces dependently reading one of the types of print data stored in a corresponding storage location of said image buffer;

a print data integration circuit integrating the plurality of types of print data read by said video interfaces to be printed on one page; and

an output mechanism outputting the integrated print data on one page.

14. (NEW) A controller controlling a plurality of types of print data to be printed on one page, each of the types of print data having an attribute comprising one of a first kind of attribute and a second kind of attribute, said controller comprising:

a separation unit separating the types of print data corresponding to an image with text into a type of print data corresponding to the image as the first kind of attribute and a type of print data corresponding to the text as the second kind of attribute;

a storage unit storing each of the types of separated print data in a different one of storage locations of an image buffer according to one of the first kind of attribute and the second kind of attribute of each type of the separated print data;

a plurality of video interfaces, each of said video interfaces independently reading one of the types of print data stored in a corresponding one of a plurality of the storage locations of said image buffer according to one of the first kind of attribute and the second kind of attribute of each type of print data; and

a print data integration circuit integrating the plurality of types of print data read by said video interfaces to be printed on one page.

15. (NEW) A method of processing a plurality of types of print data according to an attribute of each type of print data, the attribute comprising one of a first kind of attribute and a second kind of attribute and the print data to be printed on one page, comprising:

separating the types of print data corresponding to an image with text into a type of print data corresponding to the image as the first kind of attribute and a type of print data corresponding to the text as the second kind of attribute;

storing each of the types of separated print data in a different storage location according to one of the first kind of attribute and the second kind of attribute of each type of the separated print data;

reading each one of the plural types of stored print data;

applying a different image process to each one of the read plural types of stored print data; and

outputting the processed print data on one page.

16. (NEW) An image forming apparatus outputting a plurality of types of form data corresponding to one or more images to be formed on one page, each of the types of form data having an attribute comprising one of a first kind of attribute and a second kind of attribute and explicitly designated by a host computer, said image forming apparatus comprising:

an image buffer having a plurality of storage locations and storing each type of form data, one by one, in a different one of the storage locations according to one of the first kind of attribute and the second kind of attribute of each type of form data;

a plurality of video interfaces, each of said video interfaces independently reading one of the types of form data stored in a corresponding storage location of said image buffer;

a form data integration circuit integrating the plurality of types of form data read by said video interfaces to be formed on one page; and

an output mechanism outputting the integrated form data on one page.

17. (NEW) An image forming apparatus according to claim 16, wherein the plurality of types of form data stored in said image buffer contain form data corresponding to a form as the first kind of attribute and text data corresponding to a text, as the second kind of attribute, to be formed over the form.

18. (NEW) An image forming apparatus according to claim 16, further comprising:

a separation unit separating form data corresponding to an image with text into a type of form data corresponding to the image as the first kind of attribute and a type of form data corresponding to the text as the second type of attribute;

a storage unit storing each of the types of separated form data in said image buffer according to one of the first kind of attribute and the second kind of attribute of each type of separated form data.

19. (NEW) An image forming apparatus according to claim 18, further comprising:

a plurality of image processing circuits, each of said image processing circuits applying an image process to the type of form data read by a corresponding one of said video interfaces.

20. (NEW) An image forming apparatus according to claim 16, wherein the plurality of types of form data stored in said image buffer are obtained by dividing form data, corresponding to the image to be formed on one page, into a plurality of bands, each of the bands corresponding to one of the first kind of attribute and the second kind of attribute, and wherein said form data integration circuit alternately selects the form data read by each of said video interfaces and outputs the selected form data to said output mechanism.

21. (NEW) A controller controlling a plurality of types of form data to be formed on one page, each of the types of form data having an attribute comprising one of a first kind of attribute and a second kind of attribute and being explicitly designated by a host computer, said controller comprising:

a plurality of video interfaces, each of said video interfaces independently reading one of the types of form data stored in a corresponding one of a plurality of storage locations of an image buffer according to one of the first kind of attribute and the second kind of attribute of each type of form data; and

a form data integration circuit integrating the plurality of types of form data read by said video interfaces to be formed on one page.

22. (NEW) A controller according to claim 21, wherein the plurality of types of form data stored in said image buffer contain form data corresponding to a form as the first kind of attribute and text data corresponding to a text as the second kind of attribute to be formed over the form.

23. (NEW) A controller according to claim 21, further comprising:

a separation unit separating form data corresponding to an image with text into a type of form data corresponding to the image as the first kind of attribute and a type of form data corresponding to the text as the second kind of attribute; and

a storage unit storing each of the types of separated form data in said image buffer according to one of the first kind of attribute and the second kind of attribute of each type of separated form data.

24. (NEW) A controller according to claim 23, further comprising:
a plurality of image processing circuits, each of said image processing circuits applying an image process to the type of form data read by a corresponding one of said video interfaces.

25. (NEW) A controller according to claim 21, wherein the plurality of types of form data stored in said image buffer are obtained by dividing form data, corresponding to the image to be formed on one page, into a plurality of bands, each of the bands corresponding to one of the first kind of attribute and the second kind of attribute, and wherein said form data integration circuit alternately selects the form data read by each of said video interfaces and outputs the selected form data to said output mechanism.

26. (NEW) An image forming apparatus processing a plurality of types of form data according to an attribute of each type of form data, the attribute comprising one of a first kind of attribute and a second kind of attribute and being explicitly designated by a host computer, and the form data to be formed on one page, comprising:

an image buffer storing each type of form data in a corresponding one of a plurality of storage locations of said image buffer;

a plurality of video interfaces, each of said video interfaces independently reading one of the types of form data stored in a corresponding storage location of said image buffer; and

a plurality of image processing circuits, each of said image processing circuits applying an image process to the type of form data read by a corresponding one of said video interfaces.

27. (NEW) A method of processing a plurality of types of form data according to an attribute of each type of form data, the attribute comprising one of a first kind of attribute and a second kind of attribute and being explicitly designated by a host computer, and the form data to be formed on one page, comprising:

storing each type of form data in a different storage location;

reading each one of the plural types of stored form data;

applying a different image process to each one of the read plural types of stored form data; and

outputting the processed form data on one page.

28. (NEW) An image forming apparatus outputting a plurality of types of form data corresponding to one or more images to be formed on one page, each of the types of form data having an attribute comprising one of a first kind of attribute and a second kind of attribute, said image forming apparatus comprising:

a separation unit separating the types of form data corresponding to an image with text into a type of form data corresponding to the image as the first kind of attribute and a type of form data corresponding to the text as the second kind of attribute;

a storage unit storing each of the types of separated form data in a different one of storage locations according to one of the first kind of attribute and the second kind of attribute of each type of the separated form data;

an image buffer having a plurality of the storage locations and storing each type of the separated form data, one by one, in a different one of the storage locations according to one of the first kind of attribute and the second kind of attribute of each type of the separated form data;

a plurality of video interfaces, each of said video interfaces independently reading one of the types of form data stored in a corresponding storage location of said image buffer;

a form data integration circuit integrating the plurality of types of form data read by said video interfaces to be formed on one page; and

on output mechanism outputting the integrated form data on one page.

29. (NEW) A controller controlling a plurality of types of form data to be formed on one page, each of the types of form data having an attribute comprising one of a first kind of attribute and a second kind of attribute, said controller comprising:

a separation unit separating the types of form data corresponding to an image with text into a type of form data corresponding to the image as the first kind of attribute and a type of form data corresponding to the text as the second kind of attribute;

a storage unit storing each of the types of separated form data in a different one of storage locations of an image buffer according to one of the first kind of attribute and the second kind of attribute of each type of the separated form data;

a plurality of video interfaces, each of said video interfaces independently reading one of the types of form data stored in a corresponding one a plurality of the storage locations of said image buffer according to one of the first kind of attribute and the second kind of attribute of each type of form data; and

a form data integration circuit integrating the plurality of types of form data read by said video interfaces to be formed on one page.

30. (NEW) A method of processing a plurality of types of form data according to an attribute of each type of form data, the attribute comprising one of a first kind of attribute and a second kind of attribute and the form data to be formed on one page, comprising:

separating the types of form data corresponding to an image with text into a type of form data corresponding to the image as the first kind of attribute and a type of form data corresponding to the text as the second kind of attribute;

storing each of the types of separated form data in a different storage location according to one of the first kind of attribute and the second kind of attribute of each type of the separated form data;

reading each one of the plural types of stored form data;

applying a different image process to each one of the read plural types of stored form data; and

outputting the processed form data on one page.